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EXAMINER HINDENLANG, ALISON L				
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/584,235

Applicant(s)

SIMMELINK ET AL.

Examiner

ALISON HINDENLANG

Art Unit

1791

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 31 December 2009.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-8 and 10-15 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-8 and 10-15 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/GS/US)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

3. **Claims 14 and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chau (US 5296185) (already of record) optionally in view of Honnaker (US 4054468).**

4. With respect to claims 14 and 15, Chau teaches:

Spinplate comprising

at least 10 spinholes ("the spinneret may contain as many as 100 or 1000 or more" spinholes, column 5, lines 25-26),

wherein each spinhole has a geometry comprising

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an inflow zone of constant diameter of at least D_o and a length of L_o ("each hole contains: (a) an inlet (10", column 5, lines 31-32, figure 1)...,

a downstream zone of constant diameter of at least D_n and a length L_n ("a capillary section (9)", column 5, line 36) and a length/diameter ratio L_n/D_n of from 0 to 25 ("the length of the capillary section...is preferably at least about 0.1 times the diameter....is preferably no more than about 10 times the diameter of the capillary", column 5, lines 45-52), and

a contraction zone between the inflow and downstream zones having a gradual decrease in diameter from the diameter D_o of the inflow zone to the diameter D_n of the downstream zone ("a transition cone (2) where the hole narrows by an angle (θ) before entry into a capillary", column 5, lines 33-35, figure 1) and a cone angle in the range 8-75 ("the angle must be no more than about 60", column 6, lines 49-50)

5. Chau does not specifically teach a ratio L_o/D_o of at least 5. However, Chau further teaches "the size and geometry of the hole are preferably selected to maximize the stability of the dope flow through the hole" (column 6, lines 3-6). It would have been obvious to one of ordinary skill in the art at the time of the invention to optimize the L_o/D_o ratio of the constant diameter zone for the purpose of maximizing flow stability. It has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller*, 105 USPQ 233, 235.

6. Should applicant wish to argue that the teachings of Chau under *In re Aller* as cited above are insufficient to obviate the claimed L_o/D_o ratio the rejection may be considered in view of Honnaker.

7. In the same field of endeavor, spinnerets, Honnaker teaches "typically capillary diameters are 2 to 4 mils (0.05 to 0.10 mm) at L/D ratios of at least about 2.5. Preferably the diameter of the counterbore is from 6 to 12 or more times the diameter of the spinning capillary and the length of the counterbore ... is about 2 to 8 times the diameter of the counterbore" (column 4, lines 2-9, figure 2) for the purpose of obtaining

filaments with preferred tensile properties from solutions of a given viscosity (column 3, lines 66-68). It would have been obvious to one of ordinary skill in the art at the time of the invention to choose an Lo/Do ratio of at least 5 as taught by Honnaker for the purpose of producing filaments with the desired properties.

8. Claims 1-8 and 10-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kavesh (US 6448359) further in view of Chau (US 5296185) (both of record) optionally in view of Honnaker (US 4054468).

9. With respect to claim 1, Kavesh teaches:

Process for making high-performance polyethylene multifilament yarn ("preparing a high tenacity, high modulus multi-filament yarn", column 1, lines 37-39) comprising the steps of

a) making a solution of ultra-high molar mass polyethylene in a solvent ("extruding a solution of polyethylene and solvent", column 1, lines 39-40);

b) spinning of the solution through a spinplate containing a plurality of spinholes into an air-gap to form fluid filaments (through a multiple orifice spinneret into a cross-flow gas stream", column 1, lines 41-42), while applying a draw ratio ("stretching the fluid product", column 1, line 43)... DRag at least 1 ("jet draw must be at least 5:1, and is preferably at least about 12:1", column 5, lines 9-11);

c) cooling the fluid filaments to form solvent-containing gel filaments ("quenching the fluid product in a quench bath...to form a gel product", column 1, line 46-48);

d) removing at least partly the solvent from the filaments ("removing the solvent from the gel product", column 1, line 49); and

e) drawing the filaments in at least one step before, during and/or after said solvent removing, while applying a draw ratio DRsolid ("stretching the gel product", column 1, line 48), wherein

each of the spinholes has a geometry comprising a contraction zone having a gradual decrease in diameter from a diameter D0 to a diameter Dn ("the spinneret holes 28 should have a tapered entry region 30", column 4, lines 49-50)...

10. Kavesh does not define a DRfluid as claimed or teach that the spinholes have both a constant diameter inflow zone and a contraction zone.

11. In the same field of endeavor, solution spinning spin plates, Chau teaches a spinneret where "each hole contains (a) an inlet (1) (b) optionally, a transition cone (2) where the hole narrows by an angle (θ) before entry into a capillary section" (column 5, lines 31-35, figure 1) for the purpose of maximizing the stability of the process (column 6, lines 3-5). It would have been obvious to one of ordinary skill in the art at the time of the invention to substitute the spinneret of Chau for the spinneret of Kavesh for the purpose of stabilizing the process.

12. Chau further teaches that the cone angle of the transition section varies from less than about 90° to less than about 20° depending on shear rate (column 6, lines 46-52).

13. Chau further teaches "the air gap contains a draw zone where the dope is drawn to a spin-draw ratio of at least about 20, preferably at least about 40, more preferably at least about 50, and most preferably at least about 60° " (column 7, lines 58-62 – examiner understands this ratio to be DRag of the instant invention).

14. The combination of Kavesh and Chau as above does not explicitly teach a DRfluid as claimed:

Of at least 50, wherein $DR_{fluid} = DR_{sp} \times DR_{ag}$ where DR_{sp} is the draw ratio in the spinholes and DR_{ag} is the draw ratio in the air-gap, with DR_{sp} greater than 1 and DR_{ag} being at least 1

15. However, DR_{sp} is defined in the specification as $DR_{sp} = (D_o/D_n)^2$. Figure 1 of Chau clearly shows that D_o – the spinneret entry hole diameter is greater the spinneret capillary outlet and Chau specifically teaches "the hole is preferably broader at the inlet, and becomes narrower through a transition cone within the spinneret to form a capillary section that leads to the exit" (column 5, lines 59-62). Thus it would be clear that Chau

teaches a DRsp greater than 1. The combination as above teaches that the DRag must be at least 5 (Kavesh) and can be greater than 50 (Chau) for the purpose of producing fibers with a desired diameter per filament (Chau, column 7, lines 65-66). It would have been obvious to one of ordinary skill in the art at the time of the invention that the combination teaches a range of DRfluid values which includes the claimed range of at least 50 for the purpose of producing fibers with a desired diameter. Further more it has been held that where the claimed range overlaps or lies inside of a prior art range a prima facie case of obviousness exists. *See In re Werthim*, 541 F2d 257, 191 USPQ 90 (CCPA 1976).

16. The combination does not teach that the Lo/Do ratio of the constant diameter zone is at least 5.

17. Chau further teaches "the size and geometry of the hole are preferably selected to maximize the stability of the dope flow through the hole" (column 6, lines 3-6). It would have been obvious to one of ordinary skill in the art at the time of the invention to optimize the Lo/Do ratio of the constant diameter zone for the purpose of maximizing flow stability. It has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller*, 105 USPQ 233, 235.

18. Should applicant wish to argue that the teachings of Kavesh and Chau under *In re Aller* as cited above are insufficient to obviate the claimed Lo/Do ratio the rejection may be considered in view of Honnaker.

19. In the same field of endeavor, spinnerets, Honnaker teaches "typically capillary diameters are 2 to 4 mils (0.05 to 0.10 mm) at L/D ratios of at least about 2.5. Preferably the diameter of the counterbore is from 6 to 12 or more times the diameter of the spinning capillary and the length of the counterbore ... is about 2 to 8 times the diameter of the counterbore" (column 4, lines 2-9, figure 2) for the purpose of obtaining filaments with preferred tensile properties from solutions of a given viscosity (column 3, lines 66-68). It would have been obvious to one of ordinary skill in the art at the time of the invention to choose an Lo/Do ratio of at least 5 as taught by Honnaker for the purpose of producing filaments with the desired properties.

20. With respect to claim 2, Chau further teaches "the spinneret may contain as many as 100 or 1000 or more" spinholes (column 5, lines 25-26).

21. With respect to claims 3 and 7-8, Chau further teaches that the spinholes contain "(c) a capillary section (9), which is the thinnest (smallest-diameter) section of the hole where the walls are about parallel" (column 5, lines 36-38, figure 1) and "the length of the capillary section is ... preferably at least about 0.1 times the diameter of the capillary... nor more than about 10 times the diameter of the capillary" (column 5, lines 45-53).

22. With respect to claim 4, Chau as applied in the combination above teaches that the cone angle of the transition section varies from less than about 90° to less than about 20° depending on shear rate (column 6, lines 46-52).

23. With respect to claims 5 and 6, Chau as applied in the combination above teaches "the hole is preferably broader at the inlet, and becomes narrower through a

transition cone within the spinneret to form a capillary section that leads to the exit" (column 5, lines 59-62) but does not teach a specific Do/Dn ratio.

24. Chau further teaches "the size and geometry of the hole are preferably selected to maximize the stability of the dope flow through the hole" (column 6, lines 3-6). It would have been obvious to one of ordinary skill in the art at the time of the invention to optimize the Do/Dn ratio to give a desired draw ratio for the purpose of controlling the diameter of the filaments. It has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller*, 105 USPQ 233, 235.

25. With respect to claim 10, the combination does not teach that the Lo/Do ratio of the constant diameter zone is at least 10.

26. Chau further teaches "the size and geometry of the hole are preferably selected to maximize the stability of the dope flow through the hole" (column 6, lines 3-6). It would have been obvious to one of ordinary skill in the art at the time of the invention to optimize the Lo/Do ratio of the constant diameter zone for the purpose of maximizing flow stability. It has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller*, 105 USPQ 233, 235.

27. With respect to claim 11, Chau further teaches:

wherein the spinplate comprises at least 10 cylindrical spinholes ("the spinneret may contain as many as 100 or 1000 or more" spinholes, column 5, lines 25-26), and wherein each cylindrical spinhole includes an inflow zone of constant diameter Do and a length Lo ("each hole contains (a) an inlet (1)", column 5, lines 31-32, figure 1) ..., a downstream zone of constant diameter Dn and a length Ln ("a capillary section (9)", column 5, line 36, figure 1) with a length/diameter ratio Ln/Dn of at most 15 (the length of the capillary is preferably not more than about 10 times the

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diameter of the capillary", column 5, lines 50-52), and a contraction zone between the inflow and downstream zones having a gradual decrease in diameter from the diameter D_0 to the diameter D_n with a cone angle in the range of 10-60° ("the angle must be no more than about 60°", column 6, lines 49-50).

28. The combination does not teach that the L_0/D_0 ratio of the constant diameter zone is at least 10.

29. Chau further teaches "the size and geometry of the hole are preferably selected to maximize the stability of the dope flow through the hole" (column 6, lines 3-6). It would have been obvious to one of ordinary skill in the art at the time of the invention to optimize the L_0/D_0 ratio of the constant diameter zone for the purpose of maximizing flow stability. It has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller*, 105 USPQ 233, 235.

30. With respect to claim 12, the combination as applied to claim 1 above teaches DR_{sp} 's greater than 1.

31. Chau further teaches that "very high spin-draw ratios (such as 75, 100, 150 or 200 or more) may be desirable" (column 7, line 68 to column 8, line 1) for the purpose of "spinning low diameter filaments using large holes" (column 7, lines 67-68).

32. It would have been obvious to one of ordinary skill in the art at the time of the invention that the combination teaches a range of DR_{fluid} values which includes the claimed range of at least 100 for the purpose of producing low diameter fibers with a spinneret with large holes. Further more it has been held that where the claimed range overlaps or lies inside of a prior art range a prima facie case of obviousness exists. See *In re Werthim*, 541 F2d 257, 191 USPQ 90 (CCPA 1976).

33. With respect to claim 13, Kavesh further teaches:

Spinning a 3-15 mass% solution ("12 wt% linear polyethylene", column 5, line 55) of linear UHPE of IV 15-25 dl/g ("the linear polyethylene was himont UHMW 1900 having an intrinsic viscosity of 18 dl/g", column 6, lines 1-2) through a spinplate containing at least 10 spinholes ("feed the polymer solution ...to a 16-hole spinneret", column 6, line 6-7) into an air-gap ("passed through a spin gap", column 6, lines 11-12), ... and a draw ratio DR_{solid} of between 10 and 30 (see "solid state stretch" Table 1).

34. The spinhole geometry as instantly claimed is obvious over the combination as applied to claim 11.

Response to Arguments

35. Applicant's arguments filed 12/31/2009 have been fully considered but they are not persuasive.

36. Applicants argue that Kavesh does not teach controlling the draw ratio through spinhole geometry.

37. Examiner finds this argument to be unpersuasive. This is not a claimed limitation. Claim 1 includes several limitations which can be understood to limit the geometry of the spinholes which the combinations of Kavesh and Chau and Kavesh, Chau, and Honnaker as explained above make obvious but does not require a significant and controlled draw ratio in the spinholes only that DR_{sp} is greater 1.

38. Applicant argues that one of ordinary skill in the art would not consider the tapered entry region of the spinhole taught by Kavesh to a contraction zone as instantly claimed and that when combining Kavesh with Chau one of ordinary skill would only consider replacing the tapered region of Kavesh with the constant diameter inlet of Chau.

39. Examiner consider this argument to be unpersuasive. First a contraction zone is defined in claim 1 as "having a gradual decrease in diameter from a diameter D_o to a diameter D_n and a cone angle in the range from 8-75°". While Kavesh does not teach a specific cone angle the tapered zone in Figure 2 clearly illustrates a gradual decrease in diameter through the section which examiner considers sufficient to obviate a contraction zone regardless of whether or not it is used for the purpose disclosed in the instant specification.

40. Further more, in the rejection as applied above in the combination the spinneret of Chau has been substituted for the spinneret of Kavesh. Chau clearly teaches a three part spinhole with an inlet and a contraction zone as instantly claimed. As explained above while Chau does not disclose specific dimensions for the inlet part of the spinhole it is taught that the spinhole geometry is optimized to achieve a stable process. Thus it would have required only routine experimentation within the skills of one of ordinary skill in the art at the time of the invention to modify the inlet to have the claimed geometry. Additionally, as shown in the rejection over the combination including Honnaker the use of a spinhole with an inlet counterbore with an L to D ratio such as that claimed is well known.

41. Applicant argues that Kavesh can not teach a DRfluid of at least 50 because its DRsp can be only 1 and that Chau does not fix this deficiency.

42. Examiner finds this argument to be unpersuasive. First, examiner disagrees that Kavesh can on have a DRsp of 1. DRsp is defined by the specification by $(D_o/D_n)^2$ (page 4, line 19). Figure 2 of Kavesh clearly shows a spinhole with two different

diameters and defines a taper between them. Thus Kavesh would teach a DRsp of greater than 1.

43. Secondly, as explained above, the rejection substitutes the spinneret of Chau for the spinneret of Kavesh. The spinholes of the Chau spinneret have Do/Dn ratios which are greater than one (figure 1, column 5, lines 59-62) and Chau teaches DRag's from at least 20 to at least 60 (column 7, lines 58-62) depending on the desired filament diameter (column 7, lines 65-66). Further more Kavesh teaches a DRag which is preferably greater than 12 (column 5, line 11). Thus the combination clearly teaches a workable range of DRfluid which includes "at least 50" (instant claim 1) and obviates a DRfluid of "at least 100" (instant claim 12) as disclosed in the instant application.

44. In response to applicant's arguments against the references individually, examiner wishes to remind the applicant that one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

45. Finally examiner wishes to point out the fact that applicant has recognized another advantage which would flow naturally from following the suggestion of the prior art cannot be the basis for patentability when the differences would otherwise be obvious. See *Ex parte Obiaya*, 227 USPQ 58, 60 (Bd. Pat. App. & Inter. 1985).

Conclusion

46. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Examiner wishes to make of record Yamashita (US 4724109) as further proof that the instantly claimed geometry is generally known in the solution spinning art. Yamashita teaches "the spinnerets are each formed, as illustrated in cross section in Fig. 1, by boring a generally conical hole through a nozzle plate (metal plate) 1 having a thickness of 2 to 15 mm in such a manner that the hole has a diameter of 2 to 4 mm on the spinning dope inlet side 2 and a diameter of 0.1 to 0.3 mm on the spinning dope outlet side 3" (column 1, lines 27-33, figure 1).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to ALISON HINDENLANG whose telephone number is (571) 270-7001. The examiner can normally be reached on Monday to Friday 8 am - 5 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Philip Tucker can be reached on 571-272-1095. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

ALH

/Philip C Tucker/
Supervisory Patent Examiner, Art Unit 1791